

Department of Plant Pathology
Faculty of Agricultural Sciences
University of the Punjab, Lahore
Course Outline



Programme	B.Sc. (Hons.) Agriculture (Plant Pathology) 4 Year program	Course Code	PP-305	Credit Hours	3(2-1)
Course Title	Introduction to Plant Prokaryotes				
Course Introduction					
<p>Introduction to Plant Prokaryotes is an introductory one semester course that offers a broad introduction to plant prokaryotes, their origin, classification history and their role in bacterial plant diseases. The material will focus on the all interacting factors necessary for disease to occur: the pathogen, the host, the environment, and time. With knowledge of these factors, the will begin to understand the nature of bacterial plant disease, epidemics and how to manage them.</p>					
Learning Outcomes					
<p>On the completion of the course, the students will be able to</p> <ol style="list-style-type: none"> 1. Discuss the importance of diseases caused by bacteria in plants 2. Describe the symptoms and types of plant diseases caused by bacteria 3. Discuss the sources of inoculum, infection and spread plant bacterial diseases 4. Describe procedures of and conduct tests in diagnosing plant diseases caused by bacteria 5. Recognize, describe the causal agents, symptoms, disease development and management of common diseases caused by bacteria Pakistan as well as world wide. 					
Course Content				Assignments/Readings	
Week 1	<u>THEORY</u>				
	Unit-I				
	1.1 Economic importance of bacterial diseases,			Janse, J. D. 2005. Phytobacteriology: Principles and Practice. CABI Publishing	
	1.2 Classes of bacteria containing plant pathogens,				
	1.3 Types of diseases caused by bacteria				
	<u>PRACTICAL</u>			Klement, Z., Rudolph, K., and Sands, D. C. 1990. Methods in Phytobacteriology. Akadémia Kiadó, Budapest, Hungary.	
	Preparation of bacterial culture media; Symptoms of diseases caused by bacteria, bacterial streaking, Isolation of plant pathogenic bacteria;				
Week 2	<u>THEORY</u>			Janse, J. D. 2005. Phytobacteriology: Principles and Practice.	
	Unit-II				

	2.1 Origin and History of Plant Prokaryotes	CABI Publishing Assignment: Preparation of report on major bacterial diseases of plants in Pakistan and their economic losses
	<u>PRACTICAL</u> Cultural characteristics, Gram stain, KOH solubility test, catalase test	Klement, Z., Rudolph, K., and Sands, D. C. 1990. Methods in Phytobacteriology. Akadémia Kiadó, Budapest, Hungary.
Week 3	<u>THEORY</u> UNIT - III 3.1 Economic importance of bacterial plant diseases	Agrios, G.N. 2005. Plant Pathology, 5th edition, Academic Press, New York, USA
	<u>PRACTICAL</u> Set up tests for identification of bacteria: Levan formation, gelatine hydrolysis, starch hydrolysis, oxidative/fermentative test, nitrate reduction, salt tolerance	Assignment: Collection of diseased plant samples (at least 10) and isolation of the bacterial pathogen. Preparation of complete report.
Week 4	<u>THEORY</u> Unit-IV 4.1 Prokaryotic Cell wall 4.2 Differences between Prokaryotic and Eukaryotic cell wall	Agrios, G.N. 2005. Plant Pathology, 5th edition, Academic Press, New York, USA
	<u>PRACTICAL</u> Microscopic identification of fungal pathogens isolated from diseased samples.	Klement, Z., Rudolph, K., and Sands, D. C. 1990. Methods in Phytobacteriology. Akadémia Kiadó, Budapest, Hungary.
Week 5	<u>THEORY</u> Unit-V 5.1 Prokaryotic Cell Membrane 5.2 Differences between Prokaryotic and Eukaryotic cell membranes	Agrios, G.N. 2005. Plant Pathology, 5th edition, Academic Press, New York, USA

	<u>PRACTICAL</u> Identification of isolated Bacterial pathogens from diseased Plant samples	Klement, Z., Rudolph, K., and Sands, D. C. 1990. Methods in Phytobacteriology. Akadémia Kiadó, Budapest, Hungary.
Week 6	<u>THEORY</u> Unit-VI 6.1 Cell Envelope 6.2 Antibiotic Resistance	Strange, R.N. 2003. Introduction to Plant Pathology. John Willey & Sons, New York.
	<u>PRACTICAL</u> Microscopic identification of bacterial pathogens isolated from different diseased plant samples.	Klement, Z., Rudolph, K., and Sands, D. C. 1990. Methods in Phytobacteriology. Akadémia Kiadó, Budapest, Hungary.
Week 7	<u>THEORY</u> Unit-VII 7.1 Structures present to the outer surface of Prokaryotic cell 7.2 Flagella, Pilli, F factor	Kado, C. I. 2010. Plant Bacteriology. APS Press.
	<u>PRACTICAL</u> Identification of different isolated Plant Pathogens	Klement, Z., Rudolph, K., and Sands, D. C. 1990. Methods in Phytobacteriology. Akadémia Kiadó, Budapest, Hungary.
Week 8	<u>THEORY</u> Unit-VIII 8.1 Movement in Prokaryotic cell	Kado, C. I. 2010. Plant Bacteriology. APS Press.
	<u>PRACTICAL</u> Biochemical Identification of different isolated Plant prokaryotes	Klement, Z., Rudolph, K., and Sands, D. C. 1990. Methods in Phytobacteriology. Akadémia Kiadó, Budapest, Hungary.
Week 9	MID-TERM	
Week 10	<u>THEORY</u> Unit-IX	Janse, J. D. 2005. Phytobacteriology: Principles and Practice.

	<p>9.1 Reproduction in Prokaryotes</p> <p>9.2 Conjugation, Transformation, Transduction</p>	<p>CABI Publishing.</p> <p>Assignment: Prepare a report on major diseases of cash crops.</p>
	<p><u>PRACTICAL</u></p> <p>Biochemical Identification of isolated Plant Prokaryotes</p>	<p>Klement, Z., Rudolph, K., and Sands, D. C. 1990. Methods in Phytobacteriology. Akadémia Kiadó, Budapest, Hungary.</p>
Week 11	<p><u>THEORY</u></p> <p>Unit-X</p> <p>10.1 PGPRs</p> <p>10.2 Role of Plant Growth Promoting Bacteria in sustainable agriculture</p>	<p>Janse, J. D. 2005. Phytobacteriology: Principles and Practice. CABI Publishing.</p>
	<p><u>PRACTICAL</u></p> <p>Biochemical Identification of plant pathogens isolated from different diseased samples.</p>	<p>Klement, Z., Rudolph, K., and Sands, D. C. 1990. Methods in Phytobacteriology. Akadémia Kiadó, Budapest, Hungary.</p>
Week 12	<p><u>THEORY</u></p> <p>Unit-XI</p> <p>11.1 Symptoms, etiology, mode of infection in important bacterial diseases of fruits</p>	<p>Kado, C. I. 2010. Plant Bacteriology. APS Press.</p>
	<p><u>PRACTICAL</u></p> <p>Visit to areas and sampling of more diseased specimens.</p>	<p>Field visit</p>
Week 13	<p><u>THEORY</u></p> <p>Unit-XII</p> <p>12.1 Symptoms, etiology, mode of infection in important bacterial diseases of vegetables</p>	<p>Kado, C. I. 2010. Plant Bacteriology. APS Press.</p>
	<p><u>PRACTICAL</u></p> <p>Processing of collected diseased samples.</p>	<p>Report Preparation of isolated and identified Plant Pathogens</p>
Week 14	<p><u>THEORY</u></p> <p>Unit-XIII</p>	<p>Kado, C. I. 2010. Plant Bacteriology. APS Press.</p>

	13.1 Symptoms, etiology, mode of infection in important bacterial diseases of cereals	
	PRACTICAL Preservation isolated and identified pathogens	Report Preparation of isolated and identified Plant Pathogens
Week 15	<u>THEORY</u> Unit-XIV 14.1 Symptoms, etiology, mode of infection in important bacterial diseases of flowering plants	Kado, C. I. 2010. Plant Bacteriology. APS Press.
	<u>PRACTICAL</u> Preparation of permanent mounts.	Report Preparation of isolated and identified Plant Pathogens Assignment: Submission of at least 5 permanent mounts of the pathogens isolated from vegetable diseased samples.
Week 16	<u>THEORY</u> Unit-XV 15.1 Symptoms, etiology, mode of infection in important bacterial diseases of forest	Kado, C. I. 2010. Plant Bacteriology. APS Press.
	PRACTICAL Preparation of permanent mounts.	Submission of at least 5 permanent mounts of the pathogens isolated from vegetable diseased samples.
FINAL TERM		
Textbooks and Reading Material		
<ul style="list-style-type: none"> • Textbooks. In the detail course outline, one may mention chapters of the textbook with the content topics • Suggested Readings <ul style="list-style-type: none"> ○ Books <ol style="list-style-type: none"> 1. Janse, J. D. 2005. Phytobacteriology: Principles and Practice. CABI Publishing. 2. Kado, C. I. 2010. Plant Bacteriology. APS Press. 3. Agrios, G. N. 2005. Plant Pathology (5th Edition). Academic Press. 4. Schaad, N. W. et al, eds. 2000. Laboratory Guide for Identification of Plant Pathogenic 		

Bacteria, Third Edition. APS Press, St. Paul, MN.

5. Klement, Z., Rudolph, K., and Sands, D. C. 1990. Methods in Phytobacteriology. Akadémia Kiadó, Budapest, Hungary.
6. Lelliott, R. A., and Stead, D. E. 1987. Methods for the Diagnosis of Bacterial Diseases of Plants. British Society for Plant Pathology/Blackwell Scientific Publications, Oxford.

- Journals, Articles/ Reports

Resources will be shared during class

- It is preferable to use latest available editions of books. Mention the publisher & year of publication.
- The References/ bibliography may be in accordance with the typing manual of the concerned faculty/subject. Preferably follow APA 7th Edition publication manual.

Teaching Learning Strategies

1. Present real-life scenarios or case studies where students analyze symptoms, diagnose diseases, and propose management strategies.
2. Incorporate online platforms for virtual field trips, webinars with experts, or discussion forums for sharing articles and research papers.
3. Utilize multimedia resources such as videos, animations, and interactive simulations to illustrate disease life cycles, pathogen behavior, and crop responses.
4. Facilitate peer teaching sessions where students research and present on assigned topics related to vegetable crop diseases.
5. Invite guest speakers who are experts in plant pathology or experienced growers to share their knowledge and practical experiences.
6. Arrange Q&A sessions to allow students to interact directly with professionals and gain insights into current industry practices.
7. Organize field trips to local farms, agricultural extension centers, or research institutions where students can observe diseases in real crops and interact with professionals.
8. Include field or laboratory-based assessments where students demonstrate their ability to apply learned concepts to real-world situations.

Assignments: Types and Number with Calendar

Mentioned in course content

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.